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Using Livestock Gross Margin for Cattle

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Livestock Gross Margin (LGM) is a Risk Management Agency (RMA)-sponsored program that insures the feeding margin on finishing cattle. Private insurance companies first offered LGM-Cattle in major feeding states in late January of 2006. This paper examines whether LGM-Cattle is appropriate to manage risk and whether it is cost-effective relative to existing tools. The paper complements informational materials available from the RMA and insurance industry.

OVERVIEW AND AVAILABILITY

LGM-Cattle insurance covers the feeding margin only; it does not cover production risk such as mortality or poor feeding performance. LGM-Cattle places a floor price under the margin, computed as the difference between the value of fed cattle and a combination of feeder cattle and corn values. As such, the coverage is similar to hedging the "cattle crush," except LGM-Cattle bundles option-style coverage together accounting for correlation among the components. The margin does not cover costs apart from cattle- and corn-related charges. Thus fixed costs and other variable costs could increase and not be protected by LGM-Cattle. It may be attractive as a tool for those who retain ownership or are considering doing so in the future. Cattle feeders and commercial feedlots may also be interested in LGM-Cattle.

LGM-Cattle has two different types of endorsements: one for those finishing yearlings and one for those finishing calves. Coverage for yearlings is designed for 750-pound feeder cattle to be finished to 1,250 pounds. Coverage for calves is designed for 550-pound feeder cattle to be finished to 1,150 pounds. Feed use is a fixed corn (or corn-equivalent) amount. Producers can purchase coverage during a sales window that occurs at the end of a month to cover cattle to be finished over the next 11 months.

Producers estimate how many head they will market (and insure) by month for the insurance period. Should the head count within a year fall below 75% of the targeted amount, any indemnity will be prorated down. This stops a farmer from insuring more cattle than they own. They can insure up to 10,000 head in a fiscal year and up to 5,000 head in a single endorsement. There is no minimum number that can be covered.

After some initial interest, the usage of LGM has waned at the U.S. level and remains low compared to the number of cattle fed. In FY2006 there were 25,655 head covered across 10 states (predominately in Iowa). By FY2010 there were only 787 head covered across four states. However, the policies paid indemnities in each of the first four years, and coverage from FY2010 is ongoing.

Producers who want basic policy information should contact an insurance agent licensed to sell LGM. In addition, the RMA website, www.rma.usda.gov, has a section dedicated to livestock products. Of note for producers, there are links for an agent locator, policy documents, the specific coverage endorsement, a question and answer bulletin, and a premium calculator. There are also detailed underwriting rules, a long handbook with necessary forms and paperwork geared toward insurance agents, special provisions, and actuarial documents.

MARGIN EXAMPLE

The expected margin follows a formula dependent on whether the coverage is for yearlings or calves. The LGM-Cattle margins are computed for a given month as follows:

$$\text{Expected Margin (yearlings)}_t = 12.5 \text{ cwt} * \text{Live Cattle}_t - 7.5 \text{ cwt} * \text{Feeder Cattle}_{t-5} - 50 \text{ bu.} * \text{Corn}_{t-2}$$

$$\text{Expected Margin (calves)}_t = 11.5 \text{ cwt} * \text{Live Cattle}_t - 5.5 \text{ cwt} * \text{Feeder Cattle}_{t-8} - 52 \text{ bu.} * \text{Corn}_{t-4}$$

The live cattle, feeder cattle, and corn prices for a given month are the respective average futures prices from the last three trading days of that month. In non-contract months the commodity price is calculated using a weighted average of surrounding contract month prices. FY2010 was the first year without basis adjustments and with the current corn quantity factors. When comparing to prior years, either adjust the data or know that the margins now are larger with less risk coverage (and cost).

Consider the decision to purchase LGM coverage during May of 2010: a producer wants to purchase yearlings (to be placed on feed in June) that are expected to be finished in November (using corn priced in September); the November Live Cattle futures are the average of October and December; the June Feeder Cattle futures are the average of the May and August futures prices; the September Corn futures can be observed directly; the expected margin is $147.55 per head in this example (table 1).

Once the prices are realized in October, the actual margin is computed. The actual margin uses prices from the last three trading days prior to the settlement date (if relevant) or from the last three trading days of the month. If the actual margin is less than the expected margin, LGM will pay an indemnity of the difference—indemnity payments are made by the insurance company when margin losses are incurred. Note that the farm level margin a producer would realize would not have to match the national expected or actual margin. Thus, some cattle and corn basis risks exist similar to using conventional options.

The expected margins reflect differences in futures prices and feed amounts. The insurance premiums vary by coverage type, ending month, and deductible level. LGM-Cattle insurance can be purchased with deductibles that range, in $10 increments, from $0 to $150 per head. The cost for the coverage for yearlings to be finished and marketed in November with a $0 deductible was $45.55 per head. The expected margin for the calf-finish type to be marketed in November with a $0 deductible was $285.62 at a cost of $49.21 per head.

Insurance agents and producers can only obtain the official premium levels on the day coverage is available at the RMA website. However, approximate quote levels are available in advance to help producers choose between LGM-Cattle and other tools. Iowa Agricultural Insurance Innovations maintains a premium estimator, www.iaii.us, that can be used to approximate LGM premiums. The estimator prompts users for program (cattle or swine), type (yearling or calf), and deductible ($0–$150) sections. Based on current futures prices, the estimator returns projected quotes for coverage.

The historic LGM premiums reflected more bushels of corn in the margin calculations. The expected margins from FY2006-2009 were modified by removing the basis adjustments. Thus, the expected margins would not match any quoted margin for any state. The premiums were estimated using the RMA calculator, assuming a $0 deductible. There is a positive relationship between the margin level and the premium charged (fig. 1). Also, higher margin levels have greater variability in the premium level. The observations for FY2010 did not have basis adjustments, but reflect only 50.0 instead of 57.5 bushels of corn in the margin. The price of corn from the earlier period averaged $4.00 per bushel. Thus, the FY2010 expected margin is higher than earlier years by $30 per head (7.5 bushels at $4.00 per bushel). With less corn risk protection, the premium is lower for FY2010 observations.

COST OF LGM VS. PUTS

Another consideration when evaluating LGM coverage is its cost relative to options on margin components. The cost of option coverage is set in the open market, so the cost of risk protection changes continuously. LGM premiums are not explicitly tied to risk like the options markets. The cost of LGM coverage is based on actuarial costs of insuring against margin risk. Hence, the cost of LGM-Cattle and put options may be quite different, so producers should pick the most cost-effective alternative.

Put options are a standard tool producers use to cover against downside price risk from live cattle. Call options are standard tools for covering corn and feeder cattle price risk. The different options do not have the same expiration dates as LGM coverage. However, theoretical values can be derived for the coverage by using an option pricing model, where the implied volatility is the only unknown parameter. Values per head for at-the-money 6-month live cattle put options, 1-month feeder cattle call options, and 4-month corn call options were derived at different volatility levels (table 2). The cost of coverage is dominated by the live cattle puts, followed by the feeder cattle calls, regardless of the volatility level.

At low volatility levels, the combined options would cost $48 per head. This compares to the earlier LGM-Cattle quote of $45.55 per head. LGM-Cattle policies assume a 1,250-pound finish weight, making every $50 of deductible comparable to moving $4 out-of-the-money on the live cattle put option. The LGM-Cattle policy cost was $23.56 per head with the $50 deductible compared to a low-volatility live cattle put option premium of $13 per head with a strike price $4 out-of-the-money. The cost of LGM coverage

Table 1. Yearlings to be finished and sold in November

Formulas	Weights and Prices	Values (per head)
12.5 cwt. * Nov LC	12.5 cwt. * $91.88	$1,148.50
- 7.5 cwt. * June FC	- 7.5 cwt. * $108.26	- $811.95
- 50 bu. * Sep Corn	- 50 bu. * $3.78	- $189.00
Expected Margin (per head)		$147.55

Table 2. Cost per head for option coverage at different volatility levels

Implied Volatility	Live Cattle Put Options	Feeder Cattle Call Options	Corn Call Options
Low	$32 (10%)	$9 (10%)	$7 (10%)
Medium	$65 (20%)	$14 (15%)	$12 (25%)
High	$97 (30%)	$18 (20%)	$16 (35%)

Notes: Based on at-the-money options using price levels, margins, and volatility typical of the sample period. The implied volatility is shown in parentheses. Costs do not reflect commission fees.

declines as the deductible increases, reaching $3.54 per head with the $150 deductible.

A look at the historic pattern gives some indication of the size of margin to expect and how it performs relative to the actual margin (figure 2). The data are for 6-month coverage on yearlings where the basis adjustments were removed from the expected and actual margins from FY2006–FY2009. In addition, the expected and actual price of corn was computed on 7.5 bushels, and the margins were increased by the factor by month. This allows a direct comparison of the earlier years with the parameters used beginning in FY2010. The margin shows some periods of persistence; the changes do not appear to be random from month to month. For the sample period calculated, the expected margin averaged $162.18 per head, and the actual margin averaged $147.21 per head.

The 6-month-ahead expected margins (after removing basis adjustments and using 50 bushels of corn) can also be compared with the actual margins (fig. 3). There was wide variability in both margin series. LGM with a $0 deductible would have paid an indemnity when the actual margin fell below the diagonal (26 of 46 observations). Larger deductibles can be analyzed by shifting the diagonal lower in $50 increments. Thus, with a $100 deductible, LGM would have paid out 9 of 46 times. Across the sample, mean-reversion seems likely, as LGM would have paid out for 10 of 11 observations when the expected margin was above $200.

SUMMARY

When comparing the cost of LGM coverage to other risk management tools, a producer should evaluate which margin components present risk. A producer who already owns yearlings and/or corn will not face the same margin risk as a producer who seeks to purchase yearlings and/or corn. Similarly, while it is possible to purchase LGM coverage before owning yearlings and/or corn, the standard practice is to consider managing risk once the yearlings (at least) are purchased. Feed cost risk may be managed with crop insurance, purchasing practices, and storage practices. Feeder cattle may already be owned or be purchased with forward or futures contracts.

LGM-Cattle may be a viable risk management tool for feedlots. Producers are advised to assess the type of feeding margin risk they may have before purchasing LGM-Cattle. Obtaining the proper type of coverage is important. Finally, given the growing number of available risk management tools for livestock producers, a prudent manager will want the most cost-effective choice, which can be LGM-Cattle.

Figure 1. Historic LGM margins (no basis) and premiums

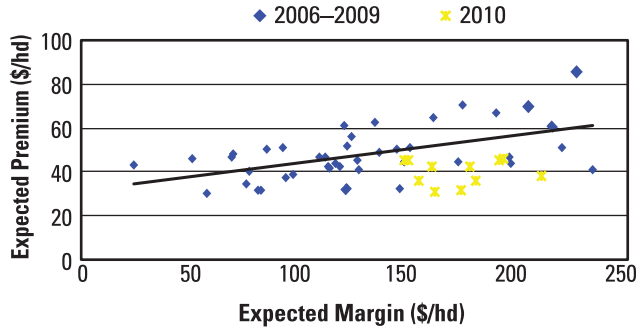


Figure 2. LGM-Cattle 6-month margin (50 bu) performance

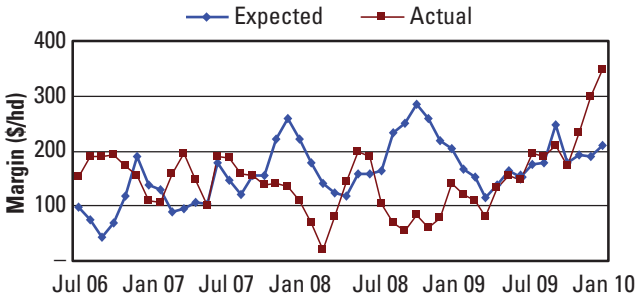
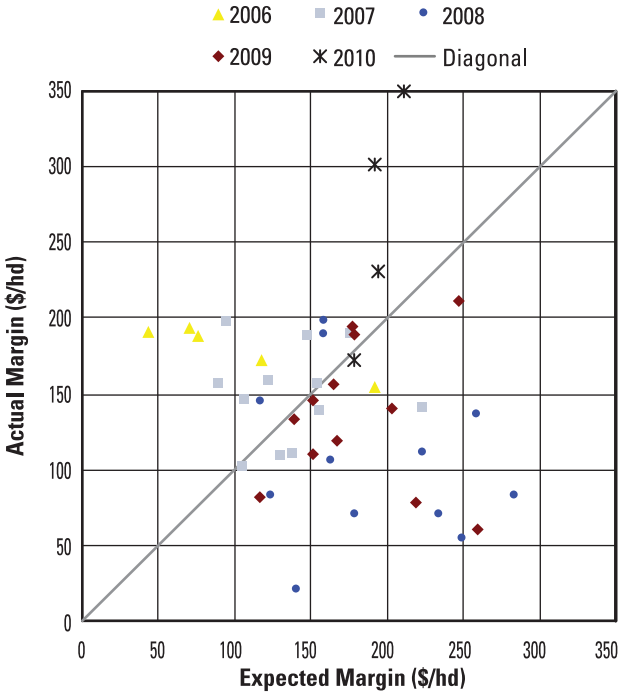


Figure 3. LGM-Cattle 6-month margins (50 bu)



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